

科技部新聞稿

「原」來學習這麼有趣！

用密室逃脫學數學解題、用擴增實境看部落自然地理！

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「原」來這麼有趣！科技部自 98 年起推動「原住民族科學教育計畫」，即是以尊重原住民文化為目標，參考聯合國永續教育指標與精神，發展出以原住民知識體系為主體的數理教材，藉此提高原住民族學童的科學與數學學習興趣與能力。該計畫迄今已發展出適用 8 個原住民族群的數理教材，提供幼兒園到高中都適用的教材內容，讓老師們上課素材更多元豐富，學生也更有學習意願。

計畫主要成果亮點包含學前教育到國小高年級階段研發完成的兒童繪本、行動展示箱、雲端學習平台和密室數學，提供兒童不同的學習經驗，讓學習充滿驚喜、挑戰與成就感。

一、書中有族語、族語有數學的太魯閣族幼兒繪本

幼兒教育是個體啓蒙的關鍵階段，文化健康的學習環境，可奠定個體良好的自我意識和穩定的情緒。由太魯閣籍幼教師與幼教專家合作所推出的太魯閣族文化繪本，採用太魯閣語及華語雙語書寫，內容對應幼兒園教保課程大綱的語文、認知、社會和美感領域課程目標，是一本適用於教師、家長和幼兒共學在地文化、數概念、族語的素材。計畫團隊印製的教學用大型繪本書，可讓幼兒在圖畫書中發現太魯閣族文化和數概念，用族語說出「自己的看見」，是國內少見兼具族語、文化和數理教育的幼兒繪本教材。

繪本電子書

<https://mostisecrr.nttu.edu.tw/index.php?R=200&TK=2&Act=1&MK=1&PK=3&SK=393>

二、打造山海教育的數位平台

以鄒族、泰雅族、雅美族的知識體系為基底，結合原住民族地理環境，打造出山海風貌的數位學習行動平台，讓使用者可使用族語編寫原住民族傳統知識與記錄當下的環境樣態。值得一提的是計畫團隊與宜蘭大同國中合作，開發運用360度3D影像科技，製作用手機就可觀看的大同鄉AR/VR自然景觀，形成實境學習情境，也增強學生對家鄉在地意識的關懷。

三、向溪流學習，魯凱族淡水魚行動展示箱

計畫團隊與屏東縣霧臺國小老師和學生們，記錄魯凱族人的漁撈智慧和在地原生淡水魚種，開發了「魯凱族淡水魚行動展示箱」，並順著北隘寮溪的上游到出海口，到沿岸的4所國小推廣魯凱族的生態智慧，推動里山、里海行動。透過計畫團隊所發展的行動展示箱，可讓學童認識魯凱族人的傳統知識與智慧，培養友善環境的生活素養；也讓平日少接觸溪流的兒童，感受到乾淨溪流才有豐富的生態。

活動影片

https://drive.google.com/file/d/1O2uwG2TnHAAMDnBANlzNdopfhd_qYTvhw/view

四、停課不停學--原住民族數理學習行動平台

計畫團隊以宜蘭南澳地區泰雅族人的傳統知識體系，研發了數理行動學習平台，讓學習不受時空限制。該平台提供教學者和學習者選單式課程資源，可自行組裝課程內容，提供「不停學」的資源與支援。教師可鼓勵學童啟動自主學習方案自訂學習內容，在線上學習與泰雅族文化連結的數學、自然和語文領域知識。

數位學習平台

<http://210.240.179.125/cpsP2/>

五、開箱有學問--有文化力才能逃脫的數學密室

計畫團隊結合師資生發展具文化回應教學的數學領域教材與教學設計，提供學生在文化脈絡中，享受學習數學的樂趣和挑戰。「密室逃脫」為師生的創作，以原住民傳說故事為軸，設計數學推理題，學童在限定的時間內，運用邏輯推理力、觀察力、聯想力、翻找能力、統整能力和文化力，以團隊合作方式

解題逃脫數學密室，培養學童解決問題和互助合作的素養。

研究成果聯絡人

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附件.計畫團隊

一	書中有族語、族語有數學的太魯閣族幼兒繪本	慈濟學校財團法人慈濟大學兒童發展與家庭教育學系 胡美智助理教授
二	打造山海教育的數位平台	國立臺灣師範大學地理學系 汪明輝副教授、王聖鐸副教授
三	向溪流學習，魯凱族淡水魚行動展示箱	國立中山大學教育研究所 謝百淇副教授
四	停課不停學--原住民族數理學習行動平台	國立臺北教育大學課程與教學傳播科技研究所 趙貞怡教授
五	開箱有學問--有文化力才能逃脫的數學密室	國立臺南大學應用數學系 陳致澄教授



Press Release

April 4, 2020

Return to Basics, Know Science “Indigene” Indigenous Science Education Project

UNESCO has proposed the local and indigenous knowledge systems (LINKS) in the last few years as the priority to advocate an improvement of the situation where knowledge became incomplete as human beings are alienated from the natural environment under western science, the fragmentation of scientific knowledge, and the lack of cross-disciplinary knowledge. Under this system, scientists work in cooperation with the indigenous people to generate the optimal body of knowledge for correct decision-making. The indigenous knowledge system plays a vital role in solving the problem of global warming and climate change. With the acceptance of the world view

of the indigenous people in combination with science, technology methods, we could harmonize with the change in the environment. The objective of education will then be the advocacy of the right of the indigenous people for receiving education. The essence of school education should start from the mindset of the indigenous knowledge to provide appropriate content of education.

The Ministry of Science and Technology (MOST) started to launch the “Indigenous People Science Education Project” in 2009 with respect of the existing culture of the indigenous people for motivating the indigenous children at school age and enhancing their capacity in the learning of science and mathematics. In combining the indicators and spirit of perpetual education under the UNESCO, MOST develop an environment for the education of mathematics and science on the basis of the knowledge system of the indigenous people. This project has already covered 8 indigenous ethnics so far and is suitable for the learning platforms for the teaching materials of science and mathematics, teaching units, illustration books, electronic books, and cloud learning in senior high schools, junior high schools, or primary schools, and could be available to the experimental schools for the indigenous people or as reference for the culturally responsive teaching curriculum.

Foundation Work of Indigenous Kids Education: Holistic Approach to Integrate Indigenous Language, Indigenous Culture, and Mathematic Education in Children Picture Book

Early childhood education is critical for inspiring individual children. A healthy cultural learning environment could help to establish positive self-awareness and stable emotion. The team of Professor Hu Mei-Chih has developed the children picture books for Truku culture. This is a joint venture between the teachers from the Truku tribe and the experts of early childhood education and is written by Chinese and the Truku. The content reflects the language, knowledge, society, and beauty for the curriculum of kindergarten level and provides teachers, parents, and children for learning indigenous culture and mathematics together. The series of children picture books are very practical and valuable. (E-book <https://mostisecrr.nttu.edu.tw/index.php?R=200&TK=2&Act=1&MK=1&PK=3&SK=393>)

Geographical Education through Virtual Reality

Peoples of Tsou, Atayal, Yami, and urban indigenous peoples are the main research subjects of the team led by Professor Wang Ming-Huey. Their research focuses on the development of geographical education based on the knowledge systems of indigenous peoples. Professor Wang Sen-Do of the team built up a digital learning platform of the indigenous geographic knowledge. Via this platform everyone is encouraged to contribute and upload indigenous geographic information to the VGI system in indigenous languages.

Cooperated with Da-Tong Junior High School in Yilan County, the team also implemented 360-degree 3D imaging technology to produce an AR/VR of Da-Tong Township, which can be browsed on a mobile phone.

Learning from Ailiao North River: Rukai Freshwater Fish Mobile Display Box

The team of Professor Shein Paichi of National Sun Yat-sen University links researchers, teachers and students of Vudai Elementary School together to document Rukai wisdom of fishing and native freshwater fish species, at the same time, the team develops a Rukai freshwater fish mobile display box, a miniature science learning ecosystem. Following the upstream of Ailiao north river to its estuary, they displayed the box to four elementary schools which are located along the river, hoping to improve ESD literacy on all students. (Film https://drive.google.com/file/d/1O2uwG2TnHAAmdBANlzNdopfhd_qYTvhw/view)

Learning without Boarder: Mobile Learning Platform of Indigenous Knowledge of Science and Mathematics

The team of Professor Chao Jen-Yi highlights the traditional knowledge system of the Atayal tribe in Nan'ao District of Yilan County and develops a mobile learning platform for science and mathematics. A menu is available for teachers and the learners for selecting and arranging curriculum resources by themselves according to their specific needs. The research findings are also applied to self-learning plans for the 12-year Basic Education Curricula. (Website <http://210.240.179.125/cpsP2/>)

Learning Mathematics and Indigenous Knowledge by Playing Escape Games

The project of Professor Chen Jih-Cheng of National Taichung University of Education cultivates elementary school teachers to be capable with diverse-cultural literacy. Through field studies, program designs, compilation of teaching materials, and empirical studies, the team developed a series of illustration books, mathematics teaching aids, and creative teaching activities.

Professor Chen and his team members integrated legends and cultures of indigenous peoples into the invention of a mathematics “Escape Room”. By playing escape games, students got lots of fun and have learned mathematics as well as indigenous culture simultaneously.

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